

# TUNING FRACTAL ANTENNAS AND FRACTAL RESONATORS

## ABSTRACT OF THE DISCLOSURE

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A first fractal antenna of iteration  $N \geq 2$  in free space exhibits characteristics including at least one resonant frequency and bandwidth. Spacing-apart the first fractal conductive element from a conductive element by a distance  $\Delta$ , non-planarly or otherwise, preferably  $\leq 0.05\lambda$  for non-planar separation for frequencies of interest decreases resonant frequency and/or introduces new resonant frequencies, widens the bandwidth, or both, for the resultant antenna system. The conductive element may itself be a fractal antenna, which if rotated relative to the first fractal antenna will alter or tune at least one characteristic of the antenna system. Forming a cut anywhere in the first fractal antenna causes new and different resonant nodes to appear. The antenna system may be tuned by cutting-off a portion of the first fractal antenna, typically increasing resonant frequency. A region of ground plane may be formed adjacent the antenna system, to form a sandwich-like system that is readily tuned. Resonator systems as well as antenna systems may be tuned using is disclosed methodology.

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